EFFECTS OF THE WAR ON SURGERY AND MEDICINE---BATTLESHIPS STILL RULE SEAS

Year Presents Record of Progress in Spite of War's Destruction

Sanitary Problems Conquered, Surgery Advanced, Science of Aeronautics Developed, Temperance Movement Spread, Heavy Gains in Church Membership.

U. S. WEALTH INCREASED AS NEVER BEFORE

The year just closed—the first full year of the greatest war in history—in spite of its unparalleled destruction, presents a record of progress and achievement in many fields of activity. It has also added much to the sum of the world's knowledge.

Over the subjoined record of the year's lessons and achievements in many branches of human activity the shadow of the great conflict appears plainly. Indeed, there is scarcely to be found a field of human labor in which the war to some degree has not entered as a factor. But it is war's constructive rather than its destructive side which is revealed here for the most part.

Paralyzing as the war has been to many activities, it has had the effect of stimulating men to mightier labors to offset its awful wastage. In this country particularly it has acted as a spur to invention and research, has led to greater efforts in the field of philanthropy, has aroused if anything a deeper religious feeling and brought a tremendous increase in our national wealth.

The year has written a brilliant page in the history of medicine and surgery. Sanitary problems heretofore believed insurmountable have been met and conquered, the health of millions of soldiers, subjected to the most dreadful kind of exposure known, has been not only conserved but even improved over what it was in times of peace; typhoid, the dread scourge of armies, has been almost eradicated, and the mortality from septicemia reduced by antiseptic surgery and antitoxins to as low as 3 per cent. Wonderful feats of surgery have been performed. In the general medical field the year has to its credit discoveries respecting the spread of typhus fever, cholera and typhoid which are likely to be of inestimable value to the human race.

Enormous Increase in National Wealth.

For this country in no way was the year more remarkable than for the increase it brought to the national wealth. Due to the war gold poured into the United States in an unending stream, until the end of year found us with more of the yellow metal than any two countries combined ever possessed before in the world's history. It saw the nation pass from a debtor to one holding the whole world in its debt, with a trade balance in its favor of more than a billion and a half. A vast increase in the amount of money in circulation and in the deposits and total resources of national banks was another feature of the year.

In the great field of electrical science notable achievements were recorded, such as the linking of the two oceans by telephone, and at the close of the year the transmission of the human voice by wireless across the continent and as far west as Honolulu and across the Atlantic to the Eiffel Tower in Paris.

The war gave added impetus to the new science of aeronautics. Not only did the year see aeroplanes standardized and turned out in great numbers like automobiles, but it saw new and bigger types evolved, types never before thought practical, enabling tremendous loads to be carried through the air at wonderful speed. And it saw an American's invention, the Sperry gyroscope stabilizer, applied to these machines in such a way as to remove most of the hazards of aerial navigation. Commercially in this new field this country as a result of war orders stepped into first place as a producer of aeroplanes and their parts.

The war, too, made its impress upon some of the great social movements of the times. The temperance movement plainly has received help from the demonstration of greater efficiency that has followed the curtailment of alcohol consumption in countries like Russia, France and England. Indications are that the cause of temperance is moving on toward greater victories, with no less than eighteen States in this country now prohibiting the sale of liquor altogether.

Great Gains in Church Membership.

Far from being a year of apathy and religious despair, the year has witnessed almost a religious revival. Tremendous gains in church membership have been made, enormous sums have been given for church purposes and the work of relief and the sale of Bibles throughout the world has taken a big jump.

In the world of art the year naturally has been remarkable. It saw New York become the art metropolis of the world, the one great city where artists could work under normal conditions. The year was also made notable by the artistic success of the Panama-Pacific Exposition.

The progress of the war itself during the year contained many valuable technical lessons, some of them foreshadowing revolutionary changes in the military establishments of nations. They have been lessons of equipment rather than tactics. Chief among them has been the enormous amount of munitions essential to the prosecution of modern war. The year brought sharply into prominence the increased function of the high explosive shell and saw the machine gun become a factor upon which the fate of whole campaigns may turn.

Though failing to produce the long awaited great sea action, the naval side of the war has not been without its technical lessons, emphasizing in the forced inactivity of the German fleet the old rule that an inferior fleet must either suffer defeat or remain in port and surrender command of the sea. It has also shown that no practical number of battleships can prevent battle cruisers of higher speed keeping the sea and destroying commerce.

DISEASE IS NO LONGER AS DEADLY AS SHOT AND SHELL

Not only have preventive medicine and surgery scored wonderful triumphs in the care of the wounded, but the medical officers in the field have succeeded in conserving the health of the armies in a way that will make the year epochal in its results, according to competent medical observers.

Discussing this record for THE SUN Dr. Louis Livingston Seaman, who visited the hospitals at the front in the early part of the war and whose investigations in the Spanish-American, Russo-Japanese, Balkan and other wars made him a competent authority, said:

"The year has been a memorable one and will form a brilliant page in the history of preventive medicine and surgery when the results attained are fully disclosed.

"In the first place it has shown that the majority of disease in war is preventable. Heretofore the mortality from disease has been from five to fifty times greater than from battle casualties. But in the year just past this record has been reversed through the enforcement of sanitary measures and in the practice of truths that have never before been put into execution.

Mortality Greatly Reduced.

"In the Crimean war, where the total mortality amounted to 52,000, 50,000 deaths were from disease, most of which were preventable. It was then that Florence Nightingale cut the red tape that entangled the medical department of the army and saved what remained of it. In our civil war, where the mortality reached 600,000, 500,000 deaths were from disease. In the Boer war ten times as many soldiers died from health as from bullets. In the Spanish-American war total losses from battle casualties were 293; from disease, 3,681. That was about thirteen to one, and the majority of deaths occurred among troops who never left this country but were quartered in camps that were mere pest holes, one of which was within sight of the dome of the Capitol in Washington.

"In the Russo-Japanese war the Japanese were keen enough to take advantage of the mistakes of past wars and to give medical men authority to enforce sanitation. The result was that the mortality was four times greater from bullets than from disease. In other words they reversed the statistics of history and made a record never before approached in the annals of war.

"In the present European war the health of the men, even when subjected to the dampness and exposure of the trenches, has been better than in time of peace. This has resulted from the enforcement of simple laws of hygiene and sanitation, good rations and the use of antitoxins in the prevention of infectious, contagious and septic diseases.

"This is the first great war in which anti-typhoid serum, first developed in this country, has been almost universally used. The result is that there now is comparatively little typhoid fever. In the early months of the war it prevailed extensively among the British and French troops in Flanders and France. The rivers were swarming with bacilli typhus, as also were other sources of water supply.

Typhoid Now in Hand.

"In some hospitals I visited two-thirds of the patients were victims of typhoid. The anti-vaccination and anti-vivisection societies of England were largely responsible for this condition. They spread a report that the typhoid vaccine shortened life and succeeded in creating such a sentiment of antagonism against it that a "no vaccination" clause in the enlistment contracts was demanded by the press, but Kitchener circumvented this by refusing men furloughs in France until they had submitted to this treatment. Now that dreaded curse of armies, typhoid, has ceased to be a serious menace.

"Wonderful progress has been made in the prevention of tetanus by the hypodermic injection of anti-tetanic serum.

"In surgery one can make no comparison with past wars because the wounds are so different, most of those caused by shrapnel producing frightful lacerations. Plastic surgery has made some advances.

"In wars of the past septicemia frequently caused 20 per cent. of the mortality among the wounded. By the use of antitoxins and antiseptic surgery and the immediate attention given to the wounded mortality has been reduced to about 3 per cent.

"In the American Women's War Hospital near Southampton there was but one fatality among the first 1,000 cases treated.

"Improved sanitation has had a marked effect. Military authorities are learning that one medical officer with authority to enforce sanitation at the front is worth ten at the rear. The medical men now see that the soldiers are properly fed, drink boiled water, have proper clothing and are properly housed. As a result there are no healthier, saner men to be found to-day than those at the front. This is one of the greatest achievements the year has witnessed."

WAR GIVES SCIENCE LITTLE—DR. BARUCH

Preventive Methods Improve, but Treatment of Wounds at a Standstill.

HOW ANÆSTHESIA FAILS

Asked by a SUN reporter to review the progress made in medicine and surgery during the year 1915, Dr. Simon Baruch said:

Your question in regard to what most impresses me in the present status of the medical profession is difficult to answer without considerable reflection. My earliest medical activities were in camp and on the battlefield over half a century ago. Naturally I am most deeply interested in the surgical developments of the great war that is now convulsing Europe and compare them with my own observations on the battlefields of the civil war. It appears to me that there has not been any improvement in the management of the seriously wounded during the past half century. I had six fatal cases of tetanus after the battle of Gettysburg and many cases of gangrene. I note that they have the same experience in the military hospitals of France. I also note, with pain, that the powerful antiseptics, which have done so much to make surgery in civil practice a joy, are utterly worthless on the battlefield and that the celebrated antiseptic discovered by Drs. Dakin and Carrel is practically the old fashioned Labarraque's solution of chlorinated soda.

Bullets No Less Deadly.

We are told that the modern rifle bullet, pointed and of small calibre, is less deadly, but to one who has seen fighting in the open and compares it with the trench firing of the present day this idea seems fallacious. It is true that, as compared with the ploughed tracks made by the minie ball, the small, smooth track of the modern rifle bullet is less destructive to the surrounding tissues; but we must not fail to take account of the fact that most of those who are wounded by rifle bullets to-day are struck in the head and die, while the only other exposed parts of the body, the arms and shoulders, receive wounds that are not so destructive to the tissues. The modern rifle bullet is indeed humane, because it ends the poor soldier's suffering, but its velocity and the modern methods of range finding make it more certainly fatal.

I have seen no account of bayonet wounds, probably because the modern larger bayonet inflicts an almost immediately fatal wound. I happen to have been surgeon of a regiment which while firing from behind a rail pile received a bayonet charge from the advance guard of Grant's army at Spottsylvania Court House. None of the wounds was fatal, although two of the men were penetrated through the chest, the point of entrance and exit of the bayonet being distinctly visible. In this regard also our results were better.

One striking advantage that the modern surgeon has over one who participated in the civil war is the great aid to diagnosis furnished by the X-ray. Well do I remember the sad necessity of digital examination of all wounds, which, as we realize now, was more fatal to the patient than the wound itself. The satisfaction the modern surgeon derives from the X-ray picture relieves him of the greatest anxiety.

No Big Medical Discoveries.

There is no epoch making discovery to be recorded in the treatment of disease during the past year. Indeed, some diseases were more scientifically treated fifty years ago, when the so-called therapeutic nihilism governed the advanced men of that day, much to the chagrin of their elders, who still bled and blistered and salivated their pneumonia patients. To-day polypharmacy is again rampant.

It is true we are learning to utilize the observations of the army surgeons of the early '60s, who discovered that a soldier suffering from pneumonia or other infectious disease did better in a tent or in the open air than in the factories and other closed buildings commandeered as hospitals; but when one reads of the multitude of new fangled combinations of proprietary drugs with which these unfortunates are plied to-day one wonders how the pneumonia patient ever escapes. I believe that the mortality of this disease is greater to-day than it was under the management of our Austin Flint and Alonzo Clark and their disciples, who gave nature a fair chance to restore its integrity. In the prevention of disease, however, we stand head and shoulders above the men of that period.

Typhoid fever, which decimated our army during the civil war, has been shorn of its malign influence by preventive inoculation; also cholera, tetanus, diphtheria and other diseases. One shrinks with horror at thought of the holocausts that would otherwise have been added to the terrific toll now exacted by shrapnel, dynamite and gas bombs. One of the marvellous discoveries of the present war is the application of the theory that typhus fever is chiefly disseminated by vermin infesting the human body. When one reads of the splendid work done by Dr. Strong, professor of tropical diseases in the Harvard Medical School, and his coadjutors, two of whom died in the noble effort of exterminating typhus fever from famine stricken Serbia, one's heart glows with satisfaction at the thought that the discovery was made by American physicians and its control accomplished by American physicians.

Typhoid Now Mastered.

The important discovery that typhoid fever is spread in civil life by individuals who unknowingly are hosts of the typhoid bacillus has obtained ample confirmation during the past year. The discovery by Dr. Victor Heiser that a large proportion of food handlers in Manila were basis of the cholera bacillus is also an important event. Positive determination of the obscure causes of two diseases, which are developed in the digestive tract, has led Health Commissioner Emerson to introduce an exacting supervision of all food handlers in this city, which will doubtless diminish the danger from this source.

Discovery of the hitherto obscure cause of disease is always matter for congratulation. By applying modern scientific methods it has been ascertained that unsuspected abscesses at the roots of the teeth may produce an infection of the entire body, leading to acute and chronic rheumatism, neuralgia, heart troubles, tuberculosis, Bright's disease and other maladies.

The passage of national and State laws, properly guarding the use of narcotic drugs, has given rise to efforts in the direction of alleviating suffering incident to the withdrawal of habit forming drugs. Unfortunately there has not been any reliable clinical observations published of drug habitues by the public hospitals.

The problem is not solved by simple elimination of these drugs from the bodies of the sufferers. They require after treatment, physical, mental and moral, which it is the duty of the public authorities to furnish. The national committee for prisons and prison labor has appointed a committee to investigate the various methods devised for the withdrawal of habit forming drugs, and it is to be hoped that philanthropic persons will find a way to do likewise.

A survey of medicine would hardly be complete without mentioning that wonderful product radium, especially in its effect upon the dreaded cancer scourge. Large experience has accumulated during the past year which shows the value of radium in external cancers, but most conservative physicians and surgeons urge all persons who detect a growth or swelling to submit it to a physician. But there is no doubt that the popularity of this wonderful remedy may induce many to waste valuable time in treatment of growths that are easily removed with the knife in the early stage, which in malignant growths is the only certain cure.

Victory's to the Strong, Year's Naval Lesson, Says Capt. Sims

By CAPT. WILLIAM S. SIMS, U. S. N.

In my opinion naval officers have learned no lessons of any importance during the past year that had not heretofore been thought out. They have always known that the only practicable defence of our coasts, commerce and outlying possessions is an efficient offensive that will give us complete command of all of the seas that include our interests—that for this purpose battleships, battle cruisers, scouts, destroyers, submarines, mine layers, and the necessary supply auxiliaries, naval stations, &c., are necessary in numbers commensurate with their task, these numbers depending upon the similar forces of possible enemies. They have always known that an inferior fleet must suffer defeat or remain in port and surrender the command of the sea; that no practicable number of battleships can prevent battle cruisers of higher speed keeping the sea and destroying commerce; that the latter can be run down only by vessels of similar speed and power; that submarines can operate successfully only by surprise, that they can be kept at bay, run down and destroyed by a sufficient number of destroyers, patrol boats, &c., properly equipped.

If there had been any real fleet actions comprising all fleet types of vessels some valuable lessons would doubtless have been learned.

On the other hand, the man on the street has learned a great deal. He learned that battleships are no good, that submarines were more powerful and much cheaper. Then he learned that battle cruisers were the real thing, and finally that submarines did not amount to much after all.

He must now be somewhat up in the air and about ready to conclude that neither he nor his representatives are competent to decide upon the extremely technical question of the types and numbers of vessels required for our defence. When he does finally so conclude he will understand that he will fulfil his whole duty when he has decided that we shall or shall not depend upon force for our protection, and if he decides for the former he may be willing to accept professional advice as to the naval forces needed.

The only really valuable lesson to date is that nothing could be more dangerous than for the public to insist upon forcing upon the Government types and numbers of vessels which in the opinion of naval officers would be inefficient or insufficient or even dangerous in use.

This would be no more reasonable or less dangerous than for the donators of a hospital to insist upon corkscrews being used exclusively for extracting appendicitis.

SHIP WITH BIG GUNS STILL MISTRESS OF SEVEN SEAS

Submarine Merely Pocket Revolver of a Fleet, Says Navy Expert—Dreadnought of Future May Make 35 Knots an Hour.

SPEED AND LONG RANGE FIRE MEAN VICTORY

The year 1915 was not as important in a technical naval sense perhaps as its predecessor because it did not produce any great naval actions. It was almost exclusively a year of submarine warfare, directed for the most part against merchantmen. The actions that did take place were mostly between smaller ships and added nothing to what the naval world already knew.

Predictions made early in the year that the cruising radius of the undersea boat would be extended were verified and the new type of large fleet submarine figured more conspicuously in the naval record of the year than did any other type of vessel. While the Germans were the first to develop this kind of undersea boat, long before the year closed British submarines with a radius of action equal to that of the German boats had penetrated the Baltic, reached the Dardanelles and appeared in the Sea of Marmora, sinking merchant vessels and enemy war vessels.

But the achievements of these submarines have not, in the estimation of most critics, justified the belief entertained by some at the time of their first appearance, that they spelled the doom of the big gun ship. Supremacy of the superdreadnought and the battle cruiser has been shown clearly throughout the year in the absolute command of the seven seas which the British navy has been able to maintain through its possession of a predominance of large fighting craft.

Big Action Awaited.

What the naval sharps have been awaiting is an action involving dreadnoughts and battle cruisers which might add new lessons in construction to those derived from the earlier actions of the war. As it is the lesson of the year has been the helpless inactivity of the German fleet in the face of England's superiority of big fighting ships.

"There has as yet been no great sea action in the fullest sense of the term," said Henry Reuterdahl, associate of the United States Naval Institute, in speaking of the war's naval lessons. "The fight at Heligoland was but a skirmish, the defeat of Cradock off the Chilean coast a duel and the sinking of the German squadron under Von Spee off the Falklands, a long chase. So the Dogger Bank affair. But the lessons are speed and gun power, the ability to put the biggest gun where it should be. Hence the victory at the Falklands. Simple superiority of gun fire plus speed. And similarly the Good Hope and the Monmouth went to their doom because the enemy had heavier guns and more speed. The Germans also were outranged in the North Sea scrap and the Blucher was sunk because of its slow speed of twenty-four knots as compared with the British battle cruisers. The destroyer of the future will be a speedier vessel. Forty knot boats are now under the white ensign.

"And this fight points out that the naval actions of the future will be fought at a greater range than heretofore—at a distance of 15,000 to 20,000 yards. The final lesson of this long range firing might point to a new type of battleship carrying no vertical armor or maybe no armor at all. This ship may mount heavy guns—15 inch and even more—and have a speed of 35 knots. Its function will be to steam on the outskirts of battle and deliver plunging salvos—a mortar fire afloat. Against such a fire naval architects have as yet devised no successful protection.

Only Efficiency Counts.

"England, prior to the war, had a trained reserve of sea going men 125,000 strong, Germany, 100,000. Officers in both navies having important positions have all been advanced through selection. Those who failed have been ruthlessly jerked out. Admiral Jellicoe, for years picked as commander in chief in case of war, was placed in command of the grand fleet, his predecessor having been quickly removed. War has no use for mediocrity. The second in command in the Dogger Bank action was dismissed from his squadron because he failed to close up the fleeing Germans.

"The minor lessons of the war in a technical sense are too many to compress in a short review. A ship's ability to withstand punishment, whether a tin can destroyer or a heavier vessel, has been underestimated. Previously the view was expressed that a ship would be sunk during the first five minutes of a fight. The actions so far have demonstrated the contrary.

"Another lesson is that the ammunition supply should be greater. When the German cruisers went to the bottom at the Falklands they had fired all their ammunition two hours before they sank. And the British battle cruisers Invincible and Inflexible at that time expended over 110 rounds per each 12 inch gun.

"This war has shown recently that in some way every ancient craft can be utilized. Gunnery tenders, station ships and cruisers from the '80s operated on the Belgian coast. Thousands of small craft patrol English waters. In the Dardanelles the old Jaureguiberry, a French battleship more than 20 years old, did distinguished work. The monitor also has come back. The eight 14 inch American guns made at Bethlehem for the Greek dreadnought Salamis originally have been mounted in the new tripod monitors Abercrombie, Roberts, Havelock and Napier and have pounded the forts of the Turks. An 'outrigger'—false underwater sides—protect each of these craft from torpedo attack. Furthermore, the Koenigsberg was sunk in an African creek by an ex-Brazilian monitor.

"The submarine will not in its present state revolutionize naval warfare. It is as yet the weapon of opportunity, like a pocket revolver. The dreadnought and the battle cruiser still hold the command of the sea."

MACHINE GUN BIG SURPRISE IN WAR

Hannibal Would Be a Good Soldier Now, Expert Thinks, but Arms Change.

DAY OF CAVALRY PASSING

The war, on its purely technical side, contained many valuable lessons for military men during the year 1915. Some of these lessons were beginning to be glimpsed as 1914 drew to a close, but it has taken the year just ended to reveal what a marked change has taken place in many of the appliances and engines of warfare.

It is an old adage of military men that tactics never change; that they are the same to-day as in the time of Hannibal. Tactically considered, therefore, fighting throughout the year has not contained any great surprises nor been such as to render necessary a change in the text books.

In the opinion of some military men the course of the war during the year has served to emphasize still more the decline in importance of the cavalry arm. This was brought out in the early months of the fighting. The Germans are reported to have made some use of cavalry in their campaign along the Baltic and there was a report that cavalry had been used by the French in a charge that formed part of the fall drive, a manœuvre which stirred the Germans to derisive comments, indicating that the German war sharps had given up cavalry for this purpose.

If the war has proved cavalry useless for its old time purposes it means that many armies will have to be remodelled, as cavalry always has been one of the important branches of an army. It is not trench warfare that has eliminated the cavalry as much as the modern machine gun, according to many officers who have been following the struggle.

Motorcycles in Vogue.

Heretofore cavalry has been used as the eyes and ears of armies, for special missions such as holding advanced positions and for heavy shock actions. For observation purposes the aeroplane has superseded the cavalryman in this war, while for capturing or holding advanced positions one motorcyclist carying a machine gun can do the work of a squadron. That, in the opinion of some, is what the year's fighting on the several fronts now has definitely established.

Shock action by cavalry—the old time charge—has not occurred in this war, for which the machine gun is largely accountable. Such a charge would mean a better target for machine guns than the open infantry charge. It is now estimated that two machine guns at the most would be amply sufficient to knock out a whole regiment of charging cavalry.

The transcendent importance of the machine gun—that is one of the great lessons of the war during the year. All over the world men now are working night and day to turn out these weapons.

"Instead of being a mere auxiliary weapon as it used to be," said Capt. Laurance Angel, who has just gone on the army retired list after serving with Gen. Wood, "the year has shown the machine gun as a main arm. At the war's beginning the Germans are said to have had six to a battalion and the Allies two. The Germans now have increased this ratio until in some regiments on their western front every other man has such a weapon. The Allies still are trying to catch up in this respect.

"It has been machine guns which have enabled the Germans to hold their western front with so few men as compared to the Allies. On portions of the front I have heard that they had a machine gun for about every two yards."

Gas Doubtful Arm.

One development in the war which the year saw was the gas attack, used first by the Germans and then by their foes. It is a great question among military men, however, whether in a parliament of the nations that must follow this war the use of gas will not be prohibited. At any rate, the military sharps are unwilling to accept gas as a problem of future warfare. It has a kickback effect which they don't like.

Perhaps one of the greatest lessons of the past year has been the increased function of the high explosive shell. In the United States army, for example, according to Capt. Angel, it had been intended before this war to supply one such shell to fourteen shrapnel shells. The experience of the year has shown that this proportion should be reversed. The high explosive shell, as Capt. Angel pointed out, is not a man killer; its primary function is to destroy material. And with the present development of field fortifications such shells are vitally necessary, shrapnel being altogether useless for this purpose.

The Germans appear to have foreseen this use of the high explosive shell. In fact, military men here give them credit for having foreseen all the conditions of trench warfare. For that reason they had their armies equipped with a large proportion of high explosive shells, which now are being used by all the armies more than shrapnel.

The year 1915 saw armies moved over much greater distances than the early months of the war. This has involved new transport problems, best details of the Russian and Serbian campaigns of the Teutons are not as yet fully obtainable. If anything the recent campaigns have served to emphasize even more than did the fighting in France and Flanders the value of strategic railways. The Russian and Galician campaigns were largely a railway war. Much of Von Hindenburg's success is attributed to the marvellous strategical railway system running to the Russian frontier. The Russians, too, had a strategic railway system connecting their various fortresses and the campaign largely centred around this system.

Railways Key to Victory.

Gen. von Hindenburg has said recently that in these days of railroads a disaster such as Napoleon met in Russia would be impossible and that armies to-day can advance almost any distance. One of the great war lessons of the year, as military men see it, is the value to any nation of a thoroughly adequate system of strategic railways.

One lesson of the year has established that the motor truck is of tremendous value in saving road space. The old method of moving army supplies by horses and mules slowly is passing. Horses still are being used by all the armies and vast numbers have been purchased, but this has been chiefly to tide over until motor trucks could be supplied.

The motor truck requires much less space on the road. In our army the wagons of a division are calculated to take up about eight miles of road. To reduce this space by one-half through the aid of motor trucks, is equivalent, army men point out, to doubling the number of roads, which the army has to move over. This is one of the lessons of the campaigns on the eastern front.

Opinion among military men is divided as to the importance in a military sense of the year's Zeppelin raids. While there are some who profess to have lost faith in Zeppelins and who believe that their military value is more than negatived by the indignation they have provoked on the side of humanitarianism, there are others who think that they have but one defect to correct before they become military engines of enormous power. Their failure, it is held, has been due to their inability to aim bombs accurately from the enormous altitude they must keep to escape anti-air craft guns. Recently the Germans are reported to have perfected such a device.

"Say what you like, the raids of the Zeppelins on London were a tremendous military achievement, one of the greatest of the year," said Capt. Angel. "London could not be reached any other way, and the fact that it has been reached and death and destruction caused by an invader on this sacred bit of British soil shows how inadequate are present means of defence for towns and fortresses when attacked by this form of military engine. Germany has put her faith in them, and, in my opinion, for good reason.

"Summing up the year's record of the war," continued Capt. Angel, "I should say that its salient features, speaking technically, were the success of the Zeppelins in reaching London, the increasing importance of the machine gun, the forging to the front of the high explosive shell, the lack of cavalry effort, the reversion to the use of hand arms, such as grenades, and, chief of all, the tremendous amount of munitions needed to conduct modern warfare.

"On this latter point, and it is the problem which all nations will study in the light of this war for many years to come, it is interesting to note that even Germany guessed short of the amount which would be required. In Germany, you know, the rule has been never to turn out a gun without at the same time turning out sufficient ammunition for the life of that gun, whether it be a revolver or a heavy field gun. For Germany to be caught short shows, therefore, how insatiable is the cry to-day for ammunition."

MURPHY STAYS ON COMMITTEE.

Reconsiders Resignation and Will Aid Newark Celebration.

NEWARK, N. J., Jan. 2.—The verbal bouquets which were tossed at the absent head of ex-Gov. Franklin Murphy at the recent meeting of the committee of one hundred, in charge of the arrangements for Newark's 250th celebration, have caused him to withdraw his resignation from that body. He had resigned because a Newark newspaper charged that he was using his position on the committee to pay political debts. Then the committee held a meeting at which Mr. Murphy was strongly praised and the newspaper was condemned. Mr. Murphy to-day sent a letter to Mayor Raymond withdrawing his resignation, and saying:

"Since the call of yourself and your associates I have had opportunity to read in the papers the report of the remarks made at the meeting of the committee of one hundred, which was called to express an opinion on my resignation as a member of that committee.

"I feel that I am quite unworthy of many of the compliments paid me, but I should be ungrateful indeed if I did not respond to a request made with such unusual expressions of confidence and good will."

NEW SPALDING WILL SUIT.

Adopted Son Accuses "Purple Mother" of Conspiracy.

SAN DIEGO, Cal., Jan. 2.—Albert Goodwill Spalding, Jr., adopted son of the late sporting goods manufacturer, has filed a contest of the will, alleging conspiracy between Mrs. Elizabeth Churchill Spalding, the widow, and Mrs. Katherine Tingley, head of the Theosophical Institute at Point Loma, near here.

This is the second contest of Mr. Spalding's will now in the Probate Court, the first having been filed by Keith Spalding, a son, of Chicago.

The basis of the contests filed by Albert G. Spalding and Keith Spalding is alleged undue influence by which the greater part of the estate of Mr. Spalding is to become eventually the property of the Raja Yoga Theosophist Colony at Point Loma, of which Mrs. Katherine Tingley, widely known as the "Purple Mother," is the head.

AVIATION'S BIG ADVANCE IN 1915 DUE TO THE WAR

Orders Flood the Plants of the United States, Which Is Now the World's Leading Manufacturer of Machines and Parts.

Asked to say what was in his opinion the greatest advance of the last year in aviation, an expert declared that it was the fact that aeroplanes are no longer built; they are manufactured. Formerly every machine was an individual entity, no stronger than its weakest part, subject to its own peculiar whims and dangers. With the great cry for more planes which the war has brought, the factories are now turning them out like automobiles, every one like every other. The aeroplane has been standardized.

Progress in aviation during the last year has been brought about almost solely by the war. The strenuous demands made by the foreign armies on their flying corps have brought the air machine further along toward perfection than fifty years of peace might have done.

So far as America is concerned the progress has been three phased. The first line of advancement has been a commercial one, the second mechanical and the third military. Practically all of our progress has been in the first two lines, while Europe's has been almost entirely military.

U. S. Leads in Manufacture.

The commercial advance in the United States has been the result of the flood of war orders pouring in during the last twelve months. America now leads in the manufacture of machines and parts. It is estimated that more than $20,000,000 has been spent for aviation here in 1915. The Curtiss company has contracts for about $15,000,000 and the new Wright company has about $5,000,000 in view. The Glen L. Martin company of Los Angeles, the Sturtevant Aeroplane Company of Massachusetts, the Burgess company of Marblehead, the Thomas company of Ithaca and a number of smaller makers are busy increasing their manufacturing facilities to catch up with the flood of business that is pouring in.

Somewhat less than $5,000,000 worth of planes and supplies were shipped abroad last year. The bulk of deliveries began late in the summer and has been increasing steadily. By the beginning of last October more aeroplanes were being sent to the Allies every day than the whole United States navy owns. The White Star liner Baltic carried 197 of them, valued at $600,000, in one cargo last summer.

One of the most important happenings of the past year commercially was the sale of the Wright Aeroplane Company of Dayton, Ohio, to a syndicate headed by William B. Thompson and T. Frank Manville last October and the subsequent increase of the company's capitalization from $1,000,000 to $5,000,000. It was announced at the time that the company intends to enter the manufacturing field on a large scale and also to resume the prosecution of the numerous suits pending for alleged infringements of its patents. Equally important with this was the sale of the Curtiss company last week.

The mechanical progress of aviation has been unprecedented and it too has been caused almost solely by the war. New machines have been evolved, the "Super-Americas" and "Super-Canadas," bigger and heavier than were before thought practical. From England comes a report of a still greater machine, nicknamed the "Super-Bullet," credited with making 160 miles an hour and carrying huge loads of men and explosives.

Could Cross the Atlantic.

The Curtiss plant is turning out "Super-Americas," flying boats which experts maintain could cross the Atlantic without difficulty. In fact this dream of aviators is conceded to be a possibility now, for the British Government recently opened negotiations with an American manufacturer for a number of freight carrying machines capable of carrying a ton of munitions each across the ocean, with the idea of saving the time lost by the slower steamships.

How many machines are in actual use abroad can only be roughly computed; but an idea may be gained from the recent report of the French Government in which it is admitted that 1,121 French aviators have been killed in the little more than a year that the war has been going on. Curtiss can turn out one America a day in his Buffalo plant and within a short time it is expected that five Canadas a day will be the output in addition to the smaller types which are being manufactured by wholesale. And this is only for one factory.

Although the Sperry gyroscopic stabilizer is not an invention of the past year, 1915 marked its acceptance by the world Powers as one of the most important parts of a perfect machine. It has made the aeroplane practically "fool proof" and eliminated the greatest hazards of flying. With one installed a pilot may leave his controls and walk out onto the wing of his machine, and the two little gyroscopes, whirling at 12,000 revolutions a minute, will virtually fly his machine for him. The aeroplane motor, always the factor which has retarded the story of the air, has been brought a step nearer perfection by the invention of a new steel alloy. Its use by American manufacturers has made it possible for them to compete satisfactorily with any of the European makers. The Curtiss plant was the first to put the new motor to an actual test when Victor Carlstrom flew from Toronto to New York on November 27, a distance of 600 miles, in an actual flying time of six hours and forty minutes.

In the phase of military progress the United States has remained practically stationary. Progress in this line has been exemplified by the belligerent Powers, in Germany's Zeppelin raids over the coast and heart of England, in the 250 mile trips of the French aeroplanes which dropped bombs on the German chemical works in Bavaria, and in the daily work of the fliers over the trenches, which has won for the service the sobriquet of "the eyes of the army."

$1,000,000 Against $200,000,000.

In the United States practically all the Government has done has been through the appropriation of $1,000,000 left for aviation by the last Congress. For purposes of comparison it may be added that the European Powers have spent $100,000,000 and appropriated $200,000,000 more for aviation in the last three years. Last April the Navy Department announced that a contract had been awarded for the construction of three hydroaeroplanes at $11,000 each, the first contract of the sort ever made in this country. In October it was announced that the Washington Navy Yard was about to begin work on one aeroplane similar to the biggest in use abroad.

A contract has also been awarded for the construction of a dirigible, of the old non-rigid type, 137 feet long, to the Connecticut Air Craft Company of New Haven for $43,636. The machine was to have been delivered by October 1. At present it is not known whether work has ever been started on it or not. In April the old war dirigible, built seven years ago by Capt. Thomas S. Baldwin for $8,000 and the only one this country ever owned, was condemned to be sold as junk.

Last November the Naval Advisory Board, of which Thomas A. Edison is the head, organized and formed a committee of aeronautics with Henry A. Wise Wood, president of the American Society of Aeronautic Engineers, as chairman and a membership composed of Howard E. Coffin, Elmer A. Sperry, P. C. Hewitt, Andrew L. Riker, M. B. Sellers and A. G. Webster. On December 22 Mr. Wood resigned from the committee, declaring that he did so because Secretary Daniels had ignored the suggestions of the committee, refused to make them public and shown himself in favor of a totally inadequate aerial defence.

The Aero Club of America had previously, as early as May, announced itself as disgusted with the small amount provided by the last Congress for aviation, and started a public fund, similar to those of France and Germany in 1912 with which to supply the National Guard of the various States with aviation sections. Already a Curtiss flying boat has been given to the First Battalion, Naval Militia, N. Y. N. G., and $12,250 has been provided for a detachment for the Signal Corps. The militia of Wisconsin has received a total of Forty-three States have been or soon will be equipped, to which the club contributes, and it is intended to continue until every State has an aviation corps.

Plan Aero-Radio Stations.

A plan to establish a chain of aero-radio stations all along the Atlantic coast for national defence has been started. Forty-three stations, 100 miles apart will be needed, the entire cost being $500,000. Portland, Me., has already started to establish the first link in the chain and ten other States are considering similar action.

The past year has been an uneventful one in the matter of records. Practically every European aviator, and a number of Americans, too, are in the army service abroad. It is probable that many world's records have been broken in the war flights, but if any new marks have been set they are, of course, not official. In this country Lieut. Byron Q. Jones, U. S. A., broke the world's record for endurance at San Diego on March 12, remaining aloft with two passengers for seven hours and five minutes. Lieut. J. E. Carberry, U. S. A., broke the American record for altitude with one passenger at San Diego, rising to 11,690 feet. On August 10 at Buffalo Raymond V. Morris broke the American record for altitude with two passengers reaching 8,024 feet and beating the mark set by Steve Macomber on June 29 of 6,496 feet. The same day Morris broke the American record by carrying three passengers up 8,105 feet.

Now records were set in hydroaeroplane flights by Lawrence B. Sperry on January 20, when he flew sixty miles from the New York Navy Yard to Oyster Bay and back in one hour and twenty-five minutes, setting a mark for both time and distance. Lieut. P. N. L. Bellinger, U. S. N., made an American record at Pensacola on April 22 by reaching an altitude of 10,000 feet in a hydro, and Lieut. H. Ter Pooten, the Dutch flier, carried a passenger 8,320 feet into the air at Los Angeles on August 21. One of the events of the year was the Curtiss trophy race for the best twenty-four hour flight in an air-boat. Many American aviators competed, and the prize was won by Oscar A. Brindley of the Pacific coast, who made 554 miles on October 29.

Among the vast total of military fatalities perhaps the one that concerned Americans most was that of Alphonse Pegoud, the French flier, last August. There were few casualties in the United States. Lincoln Beachey, killed at the Panama-Pacific Exposition on March 14, leads the short list. Among the most prominent of the others were Cecil M. Peoli, killed while testing a new giant biplane intended for the United States army; Lieut. Stolz, the navy aviator, on May 8; Capt. George H. Knox, U. S. A., killed at Fort Sill, Okla., on August 12; Donald Gregory, killed at Erie, Pa., on August 17, and Lieut. Taliaferro, U. S. A., at San Diego, October 11.

SOUTHERN FACULTY TO DINE.

Mount St. Mary's Alumni Arranges Annual Entertainment.

The New York Chapter of the Alumni Association of Mount Saint Mary's College, of Emmitsburg, Md., will entertain the members of the college faculty at their annual dinner in the Hotel McAlpin to-morrow night. John F. Cowgan, president of the chapter, will be toastmaster.

The speakers will include Mgr. Bradley, president of the college; A. V. D. Watterson of Pittsburg, president of the National Alumni Association; Judge Frank B. Guilfoile of Waterbury, Conn.; William Michael Byrne and the Rev. John Talbot Smith of New York.